



Guide G-55

STORAGE REQUIREMENTS FOR THE UPSTREAM PETROLEUM INDUSTRY

July 1995

CONTENTS

FOREWORD

SUMMARY

1.0 INTRODUCTION

- 1.1 Purpose
- 1.2 Intent
- 1.3 Applicable Facility Types
- 1.4 Applicable Material Types
- 1.5 Excluded Material Types
- 1.6 Facility Application and AEUB Notification

2.0 STORAGE DEFINITIONS

3.0 GENERAL STORAGE REQUIREMENTS

- 3.1 Environmental Protection and Safety Measures
- 3.2 Storage Duration
- 3.3 Permanent Storage
- 3.4 Temporary Storage
- 3.5 Siting
- 3.6 Equipment Spacing
- 3.7 Identification of Storage Facilities

4.0 REQUIREMENTS SUMMARY

5.0 STORAGE REQUIREMENTS FOR ABOVE GROUND STORAGE TANKS

- 5.1 Aboveground Storage Tanks with a Volume less than 5 m³
- 5.2 Aboveground Storage Tanks with a Volume Equal to or Greater than 5 m³

5.2.1 Construction

5.2.2 Secondary Containment

- 1 Containment Area
- Dikes
- Impervious Liners
- Secondary Containment for Indoor Aboveground Storage Tanks

5.2.3 Leak Detection

5.2.4 Weather Protection

6.0 STORAGE REQUIREMENTS FOR UNDERGROUND STORAGE TANKS

6.1 Construction

6.2 Secondary Containment

6.3 Leak Detection

7.0 STORAGE REQUIREMENTS FOR CONTAINERS

7.1 Secondary Containment

7.2 Leak Detection

7.3 Weather Protection

8.0 STORAGE REQUIREMENTS FOR OILY WASTE STORAGE FACILITIES

8.1 Secondary Containment

8.2 Leak Detection

9.0 STORAGE REQUIREMENTS FOR SOLID MATERIALS ON BULK PADS

10.0 STORAGE INSPECTION, MONITORING AND RECORD KEEPING REQUIREMENTS

11.0 REFERENCES

APPENDIX 1.0

Storage Requirements for Existing Facilities

- A1.1 Aboveground Storage Tanks
- A1.2 Underground Storage Tanks
- A1.3 Existing Monitoring Programs
- A1.4 Containers

TABLES AND FIGURE

Table 1 - Summary of Requirements Applicability to Oilfield Material Storage

Table 2 - General Requirements for Permanent Storage Facilities

Figure 1 - Existing Tank Inspection and Replacement Program

FOREWORD

On 11 February 1994, the Alberta Energy and Utilities Board initiated a public review of the draft report *Recommended Oilfield Waste Management Requirements* previously published in August 1993. This report was jointly prepared by several subcommittees and was overseen by a steering committee comprised of representatives from the following organizations:

Alberta Energy and Utilities Board (AEUB)
Alberta Environmental Protection
Alberta Special Waste Management Corporation
Canadian Association of Petroleum Producers (CAPP)
Alberta Health Unit Association
Alberta Oilfield Treating and Disposal Association
Environmental Services Association of Alberta

Through the public review process, the steering committee identified Oilfield Waste Storage as an issue that required resolution through a subcommittee process. Concerns were expressed that other types of stored materials besides wastes could adversely affect the environment if released. In addition, storage containment devices were not completely addressed in existing requirements. Therefore, the focus of the Storage Subcommittee was expanded to include all aspects of material storage that are applicable to the upstream petroleum industry. Considering this expanded focus, it was decided that the storage requirements would be separated from the Oilfield Waste Management Requirements and published in a separate document. As a result, this document was prepared. This document will be subject to future reviews.

The members of the Storage Subcommittee were:

Susan Halla	Alberta Energy and Utilities Board
Gary Sasseville	Alberta Environmental Protection
Richard Clark	Petro-Canada Resources
Kelly Moynihan	Imperial Oil Resources Limited
Leanne Siebert	Imperial Oil Resources Limited
Bruce Standing	Crestar Energy
Boyd Nagy	Crestar Energy
Maya Owen	Norcen Energy Resources Limited
Randy Kopjar	Norcen Energy Resources Limited
Jim Robert	Amoco Canada Petroleum Company Ltd.
Allen Hein	Chevron Canada Resources
Gary Miller	Fletcher Challenge Petroleum Inc.
Paul Wotherspoon	Paul Wotherspoon & Associates Inc.

SUMMARY

STORAGE REQUIREMENTS FOR THE UPSTREAM PETROLEUM INDUSTRY

Requirements apply to:

1. Storage containment devices installed after 1 January 1996.
(Refer to Appendix 1.0 for conditions for existing devices.)
2. Permanent storage.
(Refer to Section 3.0 for permanent and temporary storage qualifications.)
3. Storage at the following facility types:
 - o wellsites,
 - o batteries, fieldgates, satellites, custom treating facilities,
 - o compressor stations,
 - o gas plants,
 - o pipeline facilities,
 - o oilfield waste management facilities,
 - o in situ oil sands facilities, and
 - o integrated oil sands mining and upgrading schemes.
4. Storage of the following material types:
 - o produced water,
 - o crude oil,
 - o emulsions,
 - o condensates, (C₅+, non-pressurized storage),
 - o chemicals,
 - o solvents,
 - o produced sand,
 - o lubricants whose source is a non-motor vehicle engine,
 - o oilfield wastes,
 - o coke (from oil sands mining/upgrading schemes),
 - o oily waste, and
 - o bitumen.
5. Storage in the following types of containment devices:
 - o aboveground storage tanks,
 - o underground storage tanks,
 - o containers,
 - o oily waste storage facilities, and
 - o bulk pads.*(Refer to Sections 5.0 to 9.0 and the Table 2 summary.)*

1.0 INTRODUCTION

Contents

1.1 Purpose

1.2 Intent

1.3 Applicable Facility Types

1.4 Applicable Material Types

1.5 Excluded Material Types

1.6 Facility Application and AEUB Notification

1.1 Purpose of Manual

The purpose of this document is to identify the storage requirements for those materials produced, generated (including wastes), and used by the upstream petroleum industry. Containment devices addressed by this document include:

- aboveground storage tanks,
- underground storage tanks,
- containers,
- oily waste storage facilities, and
- bulk pads.

Although these requirements are applicable to permanent fixed facilities, they may also be appropriate for some temporary storage situations.

1.2 Intent

The intent of these requirements is to prevent soil and groundwater contamination by ensuring the integrity of a primary containment device and by providing adequate secondary containment, leak detection, and weather protection for the storage device.

Operating procedures, maintenance practices, and inspection programs implemented to maintain the integrity of the primary containment device must also include any associated equipment such as valves, fittings, piping, or pumps.

The Alberta Energy and Utilities Board (AEUB) will expect that any new storage containment device and associated equipment installed after 1 January 1996 will meet these requirements. Companies wishing to use other storage practices or systems must obtain approval from the AEUB. Any proposed system must provide a level of protection which, in the AEUB's opinion, is equal to or greater than these requirements.

Operators of facilities constructed and operated prior to 1 January 1996 will be required to

demonstrate that their storage practices meet the intent of these requirements as outlined in Appendix 1.0.

1.3 Applicable Facility Types

These requirements apply to all facilities under the jurisdiction of the AEUB which may include:

- wellsites,
- batteries, fieldgates, satellites, custom treating facilities,
- compressor stations,
- gas plants,
- pipeline facilities,
- oilfield waste management facilities,
- in situ oil sands facilities, and
- integrated oil sands mining and upgrading schemes.

For those facilities (e.g. gas plants, compressor stations, and some oil sands facilities) that also require an operating approval from Alberta Environmental Protection (AEP), the material storage requirements may also be specified in the AEP approval. The AEP requirements will generally be consistent with these requirements.

1.4 Applicable Material Types

Any material that could adversely affect the environment and is produced, generated, or used by the upstream petroleum industry must be stored in accordance with these requirements. The storage of surface dischargeable water and inert solids are excluded from these requirements. Applicable material types include:

- produced water,
- crude oil,
- emulsions,
- condensates, (C₃+, non-pressurized storage),
- chemicals,
- solvents,
- produced sand,
- lubricants other than for non-motor vehicle use,
- oilfield wastes,
- coke (from oil sands mining/upgrading schemes),
- oily waste, and
- bitumen.

Table 1 summarizes applicable references to the storage of specific materials.

1.5 Excluded Material Types

The storage requirements for the following materials are currently addressed by other regulations and standards, as noted below, and are therefore not covered by these

requirements:

- natural gas liquids (C_2 to C_4 , pressurized storage),
- fuels,
- sewage,
- scrap metal,
- sulphur,
- oil sands tailings,
- garbage,
- construction materials, and
- lime sludge.

The storage of natural gas liquids must conform to the National Standard of Canada Propane Installation Code CAN/CGA-B149.2-M91.

Aboveground and underground *pressurized* vessels that are part of an active production process (e.g. flare knockouts and amine surge/drain tanks) and pipeline drip vessels are not within the scope of these requirements provided that they have been designed and are registered with the Boilers and Pressure Vessels Branch of Alberta Labour for a working pressure of 15 psi or more and they are maintained in accordance with the appropriate ASME codes as required by the Alberta Labour Acts and Regulations. All aboveground and underground *non-pressurized* vessels which are not registered with the Boilers and Pressure Vessels Branch are subject to these requirements.

Fuels (e.g. diesel and gasoline) that are stored in aboveground and underground storage tanks shall comply with the requirements of the Alberta Fire Code, section 4.3. They may also require registration with the Petroleum Tank Management Association of Alberta (PTMAA).

The storage of sulphur must conform to the requirements of ERCB IL 84-11.

The storage of oil sands tailings must be approved by the AEUB and AEP as addressed by ERCB IL 94-19.

Lime sludge ponds at in situ oil sands plants are covered by AEP Conservation and Reclamation Approvals.

1.6 Facility Application and AEUB Notification

Permanent stand-alone facilities constructed for the sole purpose of oily waste storage or oilfield waste storage are subject to these requirements and must be approved by the AEUB. For application information, refer to *Oilfield Waste Management Facility Application Requirements* in the AEUB document *Oilfield Waste Management Requirements*.

Written notification of oilfield waste storage areas that are constructed by the operator as part of an existing AEUB approved oil and gas or oil sands facility for the purpose of collecting oilfield or oily wastes from one or more of their own facilities in the local geographical area, must be submitted to the appropriate AEUB area office. The notification

shall describe the:

- design of the storage facility,
- type(s) and volume(s) of stored materials,
- duration of storage, and
- the final disposal/treatment methods of the stored waste materials.

The AEUB will only "respond" to the notification if clarification is required or if, in the AEUB's opinion, the proposal does not meet the requirements specified in this document.

TABLE 1 SUMMARY OF REQUIREMENTS APPLICABILITY TO OILFIELD MATERIAL STORAGE

Material Stored	Applicable		Alternate Reference
	Yes	No	
-			-
Bitumen	y	-	-
Blowdown Water from Shallow Gas Operations	-	x	ERCB IL 93-10.
Chemicals	y	-	-
Coke	y	-	-
Condensate (C ₅ +, non-pressurized)	y	-	-
Construction Material	-	x	ERCB Oil and Gas Conservation Regulations, section 8.150 (6) & (7).
Crude Oil	y	-	-
Drilling Fluids	-	x	ERCB General Bulletin GB 95-4 & Interim Working Document for Drilling Waste Management. CAODC Environment Guidelines.
Emulsions	y	-	-
Fuels	-	x	Alberta Fire Code, Petroleum Tank Management Association of Alberta.
Garbage	-	x	Alberta Public Health Act.
Lubricants (motor vehicle)	-	x	Alberta Fire Code.
Lubricants (non-motor vehicle)	y	-	-
Natural Gas Liquids C ₂ to C ₄ in pressurized storage	-	x	National Standard of Canada Propane Installation Code CAN/CGA- B149.2 M91; Alberta Labour Boilers Branch.
Oil Sands Tailings	-	x	ERCB IL 94-19, ERCB Guide G-23.

Oilfield Wastes (including bulk materials: i.e. contaminated soils, dessicant, catalyst, activated carbon)	y	-	-
Oily Waste	y	-	-
Pipeline Drip Fluids	-	x	Canadian Standards Association Oil and Gas Pipeline Standards, Z662-94.
Produced Sand	y	-	-
Produced Water	y	-	-
Scrap Metal	-	x	ERCB Oil and Gas Conservation Regulations, section 8.150 (6) & (7).
Sewage	-	x	AEPEA, Wastewater and Storm Drainage Regulation. Sanitary Sewage Management Guidelines for Industrial Operations, AEP.
Solvents	y	-	-
Sulphur	-	x	ERCB IL 84-11, GB 92-4.
Lime Sludge (Oil Sands Facility)	-	x	AEP C & R Approval.

2.0 STORAGE DEFINITIONS

The following definitions apply to these storage requirements.

Aboveground Storage Tank:

A tank that sits on or above the ground surface and whose top and complete external sides can be visually inspected.

Adverse Effect:

An impairment of or damage to the environment, human health or safety, or property.

Bulk Pads:

A ground surface area designated for the segregated storage of materials without the use of a container or tank.

Container:

Any portable above ground containment device (e.g. drums, pails, bags, boxes, totes, etc.) which has a capacity that does not exceed 1 m³.

Containment Device:

See "Primary Containment Device" and "Secondary Containment Device".

Environment:

All components of the earth including air, land and water; all layers of the atmosphere, all organic and inorganic matter and living organisms; and interacting natural systems.

Impervious:

A material that demonstrates a permeability less than 10^{-6} cm/s.

Leak Detection System:

A system, including visual, designed for the early detection and collection of any leakage from a primary containment device.

Liquid:

A substance that contains free liquids as determined by the US EPA Method 9095 Paint Filter Liquids Test, "Test Methods for Evaluating Solid Wastes Physical/ Chemical Methods" (EPA Publication No. SW 846).

Monitoring Well:

A well used to monitor the detection of liquid leakage from an underground primary or secondary containment device, or a well placed into a specific zone to enable the sampling of groundwater and to detect the presence of any leachate in the groundwater aquifer or the unsaturated zone.

Oilfield Waste:

An unwanted substance (by the generator) or mixture of substances that results from the construction, operation, or reclamation of a well site, oil and gas battery, gas plant, compressor station, crude oil terminal, pipeline, gas gathering system, heavy oil site, oil sands site, or related facility.

Oily Waste:

A specific type of oilfield waste that contains oil generated during conventional oil, in situ oil sands, and heavy oil production and includes oily sands and sludges, slop oil, and oil containing small quantities of snow, earth, or other debris collected as a result of oil spills or other site clean-up activities.

Oily Waste Storage Facility:

A system or arrangement of tanks or other approved surface equipment for the receiving and holding of oily waste material.

Primary Containment Device:

A device used to physically contain materials produced, generated, and used by the upstream petroleum industry. Primary containment devices include, but are not limited to, single walled tanks and containers.

Secondary Containment Device:

An impervious barrier placed between the primary containment device and the ground beneath and surrounding it for the purpose of containing and preventing any leakage from the primary containment device from impacting the environment.

Small Quantity Exemption:

Oilfield wastes (other than those substances listed in Part B of Table 4 of the Schedule to the "Alberta Users Guide for Waste Managers" published by AEP) are not considered dangerous and are exempt from the storage requirements if they are produced at any single site in an amount less than 5 kilograms per month if a solid or 5 litres per month if a liquid and the total quantity accumulated does not exceed 5 kilograms or 5 litres at any time.

Solids:

A substance that does not contain *free* liquids and is not gaseous at standard conditions.

Storage:

The holding of materials produced, generated, and used by the upstream petroleum industry for a period of time until the products or wastes are transported, treated, or disposed.

Storage Area:

A segregated area of an operating facility that is used to store materials produced, generated, and used by the upstream petroleum industry in containers and/or tanks and includes all land and associated structures.

Storage Facility:

A facility dedicated to the storage of materials produced, generated, and used by the upstream petroleum industry in containers and/or tanks and includes all land and associated structures.

Tank:

A device designed to contain materials produced, generated, and used by the upstream petroleum industry which is constructed of impervious materials that provide structural support and may include such materials as concrete, plastic, fibreglass reinforced plastic, or steel.

Underground Storage Tank:

A tank that is partially or completely buried and does not allow for the visual inspection of the top, complete sides, and bottom of the tank without excavation.

Vaulted Storage Tank:

A tank that is contained in a concrete or other type of solid walled space (e.g. vault) either below or aboveground level. The vault can be accessed through a man-way or a top which is open to atmosphere. It may or may not be possible to visually inspect the tank on all sides.

Watercourse:

The bed and shore of a river, stream lake, creek, lagoon, swamp, marsh, or other natural body of water, or a canal, ditch, reservoir, or other man-made surface feature whether it contains or conveys water continuously or intermittently.

Weather Protection:

A structure, protective coating, or cover which ensures that the physical integrity of primary containment devices are not compromised by the elements of nature.

3.0 GENERAL STORAGE REQUIREMENTS

Contents

3.1 Environmental Protection and Safety Measures

3.2 Storage Duration

3.3 Permanent Storage3.4 Temporary Storage3.5 Siting3.6 Equipment Spacing3.7 Identification of Storage Facilities

3.1 Environmental Protection and Safety Measures

Any material produced, generated, and used by the upstream petroleum industry that may cause an adverse effect if introduced into the environment, must be stored in a manner that meets the intent of these requirements. In addition to the specific measures addressed in sections 4.0 to 10.0, the following environmental protection and safety measures should be considered:

- Selecting a storage site that minimizes the potential for environmental concerns.
- Implementing operating procedures, maintenance practices, and inspection programs to maintain the integrity of the primary containment device and any associated equipment such as valves, fittings, piping, or pumps.
- Storing the materials in a manner such that:
 - a) materials do not generate extreme heat or pressure, or cause a fire or explosion,
 - b) materials do not produce uncontrolled fumes or gases that pose a risk of fire or explosion,
 - c) materials do not damage the structural integrity of a storage facility, and
 - d) incompatible materials are segregated to prevent contact even in the event of a possible release.

In the interest of increased public safety and environmental protection, materials shall not be stored indefinitely. The AEUB will require that companies have accurate inventory records of stored materials. Record retention and material tracking requirements for wastes are addressed in the AEUB *Oilfield Waste Management Requirements*. For production materials, inventory records are typically handled through the use of the standard AEUB production reporting forms.

In addition, the design, construction, and operation of all material storage facilities under the jurisdiction of the AEUB should follow recommended industry practices (e.g. API, CSA, ULC, ASTM, NACE) and comply with the following Acts and their Regulations:

- Alberta Energy and Utilities Act,
- Oil and Gas Conservation Act,
- Oil Sands Conservation Act,

- Pipelines Act,
- Occupation Health and Safety Act (and the Workplace Hazardous Material Information System),
- Safety Codes Act (Alberta Fire Code and the Boiler and Pressure Regulation),
- Environmental Protection and Enhancement Act, and
- Hazardous Products Act (Federal).

The operator must apply good housekeeping practices at the site and ensure that the usage of associated equipment (e.g. nozzles, hoses, and other storage system fittings) does not compromise the integrity of secondary containment systems.

3.2 Storage Duration

It is expected that materials will be consumed within a period of 2 years. For oilfield wastes, the maximum storage duration shall be one year. In the majority of cases, products, materials, and wastes will usually move through the production system in a lesser time period.

3.3 Permanent Storage

Permanent storage refers to the storage of materials produced, generated, and used by the upstream petroleum industry in a device that is a permanent fixed part of an operating facility. Permanent storage devices may include:

- underground tanks,
- aboveground tanks,
- containers,
- lined earthen excavations, and
- bulk pads.

3.4 Temporary Storage

Temporary storage refers to the storage of materials produced, generated, and used in specific operations of the upstream petroleum industry and should typically not exceed 3 months. Specific operations associated with temporary storage are:

- plant turnarounds,
- some types of construction operations,
- containment and clean-up of a spill,
- emergency conditions, and
- well drilling, completions, testing, or servicing operations (e.g. portable test tanks).

At the end of the specific operation, the stored materials must be transferred to a permanent storage facility/area or be appropriately treated and/or disposed. It is expected that temporary storage will meet the intent of these requirements (e.g. secondary containment) so as to minimize environmental impact and ensure public safety. In temporary storage situations, contaminated materials or materials possessing the potential to leach must not be stored directly on the ground. Application for the approval of temporary storage is not required.

Production batteries used for a temporary period (less than 18 months) are not required to install impervious liner systems. However, the equipment spacing and diking requirements must be met.

3.5 Siting

Siting considerations must be incorporated into the design of storage areas/facilities. A storage area/facility shall be located so that it meets the following criteria:

- Readily accessible for fire fighting and other emergency procedures.
- Not located in a flood plain.
- Chosen so as to minimize the risk of environmental damage including any threats to the quality of surface water and groundwater, and the health of humans, animals, and plants during the construction, operation, and closure of the storage area/facility.
- Not located within 100 metres of the normal high water mark of a body of water, permanent stream, or water well used for domestic purposes.

It is recognized that when temporary storage is associated with emergency situations there may be limitations with implementing the above criteria.

3.6 Equipment Spacing

All storage facilities must comply with the equipment spacing requirements identified in sections 8.030 (2), 8.080 (2), and 8.090 of the Oil and Gas Conservation Regulations.

3.7 Identification of Storage Facilities

All stand-alone storage facilities shall have signs, as per section 6.020 and Schedule 12 of the Oil and Gas Conservation Regulations, at the entrance to the facility indicating the operator name, emergency phone number, and legal description. Within a storage facility and at storage areas that form part of an operating facility, signs should indicate the materials that are stored, warnings, and any general housekeeping practices that should be followed in the storage area (e.g. segregation).

4.0 REQUIREMENTS SUMMARY

4.0 Requirements Summary

Storage requirements for materials produced, generated, and used by the upstream petroleum industry are based on concern for:

- the type of material being stored,
- the volume of material being stored,

- the length of time the material is stored, and
- the nature and integrity of the primary containment device.

The sections which follow in these requirements outline the primary containment device, secondary containment, and leak detection requirements for aboveground storage tanks, underground storage tanks, containers, oily waste storage facilities, and bulk pads (e.g. permanent storage facilities).

A summary of the general storage requirements for permanent storage facilities are presented in Table 2.

TABLE 2		GENERAL REQUIRMENTS FOR PERMANENT STORAGE FACILITIES			
		(Refer to noted test section for specific information)			
Primary Containment Device / Size **	Text Section	Design & Construction	Secondary Containment	Leak Detection	Weather Protection
Aboveground Tank (1 m ³ to 5 m ³) ***	Section 5.1	<ul style="list-style-type: none"> • Supplier specifications. • Non-leaking hoses, fittings and nozzles. 	<ul style="list-style-type: none"> • Not required. 	<ul style="list-style-type: none"> • Monthly visual inspection. 	<ul style="list-style-type: none"> • External weather protective coating or made from a weather resistant material.
Aboveground Tank (>5 m ³) ***	Section 5.2	<ul style="list-style-type: none"> • Cathodic protection in corrosive environments. • External coating for steel tanks and internal coating in corrosive environments. 	<ul style="list-style-type: none"> • Graded containment area. • Dike (or curbing for indoor tanks) capacity 110% of tank or 100% plus 10% of aggregate volume if more than one tank. • Impervious liner. 	<ul style="list-style-type: none"> • Monthly visual inspection. • Sand / gravel over liner and leakage collection area. • May also include interstitial space monitoring. 	<ul style="list-style-type: none"> • External weather protective coating or made from a weather resistant material.

Underground Tank*** (Any size and includes tanks, cement vaults, and sumps)	Section 6.0	<ul style="list-style-type: none"> Integrity testing of tank and piping prior to servicing. External coating and cathodic protection for steel tanks. Possible internal coating. 	Must include one of: <ul style="list-style-type: none"> double walled tanks, impervious liner, or vaulted tanks 	<ul style="list-style-type: none"> Liner / monitoring well. Interstitial space monitoring. Monthly visual inspection. Weeping tile system 	<ul style="list-style-type: none"> Not applicable.
Container or a Group of Containers or an Above Ground Tank (<1 m ³ total)	Section 7.0	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Not required. 	<ul style="list-style-type: none"> Monthly visual inspection. 	<ul style="list-style-type: none"> Not required.
Container or a Group of Containers (>1 m ³ total)	Section 7.0	<ul style="list-style-type: none"> Compatibility between container and stored materials. Segregated areas. 	<ul style="list-style-type: none"> Dike, curb, and / or collection tray. 	<ul style="list-style-type: none"> Monthly visual inspection. 	<ul style="list-style-type: none"> Physical cover (e.g. covered container or roof) or protective coating.
Oily Waste Storage Facility	Section 8.0	<ul style="list-style-type: none"> Specific to facility. 	<ul style="list-style-type: none"> Impervious liner. 	<ul style="list-style-type: none"> Weeping tile. Monitoring well. 	<ul style="list-style-type: none"> Specific to facility and material type.
Bulk Pad (Solid Material)	Section 9.0	<ul style="list-style-type: none"> Specific to facility. 	<ul style="list-style-type: none"> Impervious liner. Containment curb or dike. 	<ul style="list-style-type: none"> Specific to material type. 	<ul style="list-style-type: none"> Specific to facility and material type.
*	Applies to new storage facilities constructed and operated after 1 January 1996. Applies to the permanent storage of produced water, crude oil, emulsions, condensates, chemicals, solvents, produced sand, lubricants other than for motor vehicle use, oilfield wastes, coke, oily waste, and bitumen. Maximum storage duration should not exceed 2 years, except for oilfield wastes which should not exceed 1 year. All inventory records and leak detection monitoring results must be kept for 2 years.				
**	Internal volume.				

***	Tank requirements apply unless the fluids being stored are waters which meet the surface discharge criteria (chloride < 500 mg/litre maximum; pH 6.0 to 9.0; no visible hydrocarbon sheen; and no other chemical contamination) or are fluids which are infrequently stored in tanks and the tanks are emptied immediately.
-----	---

5.0 STORAGE REQUIREMENTS FOR ABOVEGROUND STORAGE TANKS

Contents

5.1 Aboveground Storage Tanks with a Volume less than 5 m³

5.2 Aboveground Storage Tanks with a Volume Equal to or Greater than 5 m³

5.2.1 Construction

5.2.2 Secondary Containment

Containment Area

Dikes

Impervious Liners

Secondary Containment for Indoor Aboveground Storage Tanks

5.2.3 Leak Detection

5.2.4 Weather Protection

Aboveground storage tanks may include steel (e.g. welded and/or skid mounted), plastic (e.g. totes, slips, chemical bulk type, etc.), and fibreglass reinforced plastic tanks. Bolted tanks are not a preferred containment device for new installations. Aboveground storage tanks with an internal volume less than 1 m³ are considered to be containers (see Storage Requirements for Containers, section 7.0).

5.1 Aboveground Storage Tanks with an Internal Volume less than 5 m³

An aboveground storage tank, or collection of tanks, with a total internal volume greater than 1 m³ but less than 5 m³ (e.g. mounted methanol/glycol/chemical tanks) must:

- be visually inspected on a monthly basis to verify their integrity,
- have operable and non-leaking fittings, nozzles, and hoses, and
- be either coated (e.g. painted) or made from a weather resistant material (e.g. plastic or fibreglass).

Non-visual leak detection and secondary containment provisions are not required for these aboveground storage tanks. However, these provisions should be considered where a release or spill could not be contained on site or where a spill or release could reasonably be expected to present a risk to a stream, water body, groundwater, or cause other environmental concerns.

5.2 Aboveground Storage Tanks with an Internal Volume Equal to or Greater than 5 m³

An aboveground storage tank, or collection of tanks, with a total combined internal volume equal to or greater than 5 m³ shall have the following construction, leak detection, secondary containment, and weather protection provisions. These provisions are not required if the fluids being stored meet either of the following criteria:

- Water which meets the surface discharge criteria:
 - a) chloride content: 500 mg/L maximum, (e.g. test strips),
 - b) pH: 6.0 to 9.0, (e.g. test strips and/or meter readings),
 - c) no visible hydrocarbon sheen, and
 - d) no other chemical contamination.
- Fluids, other than surface dischargeable water, which are infrequently stored in the tanks and the tanks (e.g. pop tanks, compressor oil drain tanks, other emergency containment tanks, pigging fluid catchment devices) are emptied immediately. Tanks must be regularly inspected to verify their integrity.

5.2.1 Construction

General construction factors for aboveground storage tank facilities are as follows:

- Aboveground storage tanks shall be designed, fabricated, tested, and installed to appropriate engineering and construction standards.
- Steel tanks shall be externally coated and if storing corrosive liquids should also be internally coated or lined to minimize corrosion. In corrosive environments, it may be appropriate to apply cathodic protection to aboveground steel tanks.
- Tank loading and unloading areas shall be designed such that any spills or leaks will be collected.

It is recommended that operators incorporate measures to prevent the overfilling of tanks; this may include automatic shut-off devices, high level alarms, two stage alarms, visual indicators, or any other appropriate measure that will prevent overfilling.

5.2.2 Secondary Containment

Operators shall provide a secondary containment system that will contain any leakage. All tanks must be placed on an impervious compacted clay or synthetic liner and surrounded by a dike that is overlain by the impervious liner material.

Containment Area

Surface run-off water collected within the secondary containment system must be field tested and meet the following criteria prior to being released, in a controlled fashion, to adjacent lands:

- a) chloride content: 500 mg/L maximum, (e.g. test strips),
- b) pH: 6.0 to 9.0, (e.g. test strips and/or meter readings),
- c) no visible hydrocarbon sheen,
- d) no other chemical contamination,
- e) landowner consent,
- f) water must not be able to flow directly into any watercourse, and
- g) each release must be recorded including the pre-release test data and the estimated volume of water released.

At AEUB/AEP jointly administered facilities, the discharge of collected surface run-off water shall also be conducted as described in the facility's AEP approval.

The diked containment area shall be graded to a sump or low lying area (within the diked area) to allow for the collection of rainwater, snow-melt water, and any possible leakage from the tanks. No uncontrolled discharge of surface run-off water is permitted.

Dikes

A dike shall meet the following criteria:

- a) constructed with earthen, concrete or synthetic material that will not deteriorate or develop leaks during the projected life of the structure and will withstand the hydrostatic head associated with it being full of liquid,
- b) sized to be at least 110% of the capacity of the tank when the diked area contains one tank, or when the diked area contains more than one tank, 100% of the volume of the largest tank plus 10% of the aggregate capacity of all other tanks,
- c) have no openings in the dike (e.g. dike drains), and
- d) maintained in good condition. The area encompassed by the dike will be kept free from extraneous combustible material.

Impervious Liners

A dike area liner shall meet the following criteria:

- a) consist of a material that is inert to or compatible (chemically resistant) with the material being stored,
- b) a permeability of 10^{-6} cm/s or less (e.g. 0.5 metres or more of compacted clay, a minimum of 30 mil geo-membrane liner or current accepted standards),
- c) durable and appropriate for the operating and ambient conditions, and
- d) cover the dike and the area within the dike (including the area beneath the tanks) and be keyed into the dike walls.

Any other method or device proposed by the operator which, in the AEUB's opinion, will provide a level of protection which is equal to or greater than any of the above methods or devices is acceptable.

Secondary Containment for Indoor Aboveground Storage Tanks

Indoor aboveground storage tanks shall be surrounded by a containment device (e.g. an impervious containment wall or curbing) and/or drain and collection tank that has a capacity at least 110% of the capacity of the tank when the diked area contains one tank, or when the diked area contains more than one tank, 100% of the volume of the largest tank plus 10% of the aggregate capacity of all other tanks. Additional provisions of the Alberta Fire Code may also apply.

5.2.3 Leak Detection

Operators must be able to demonstrate the integrity of their tanks and verify whether any material has escaped. Leak detection methods for aboveground storage tanks include the following:

- Monthly visual inspections of tanks and the liner surface of the diked area for evidence of problems, damage or leakage. Any spills or leaks must be cleaned up and, as required, corrective action shall be initiated. Any abnormal circumstances must be documented.
- Incorporation of a layer of porous material such as sand and/or gravel over the liner and underneath the tanks to provide protection to the liner and to allow any leakage to move preferentially through the porous material to a collection area within the dike area.
- Any other system proposed by the operator which, in the AEUB's opinion, will provide a level of protection which is equal to or greater than any of the above systems.

Additional leak detection provisions may also include the incorporation of sub-liner leakage detection devices (e.g. weeping tile system). Refer to section 10.0 for the requirements on the frequency of leak detection monitoring. Operators should also be aware of the inspection frequencies referenced in section 4 of API Standard 653.

5.2.4 Weather Protection

Weather protection is intended to preserve the integrity of the primary containment device (e.g. tank). For aboveground storage tanks, this is usually achieved by painting the exterior with a protective coating.

6.0 STORAGE REQUIREMENTS FOR UNDERGROUND

STORAGE TANKS

Contents

6.1 Construction

6.2 Secondary Containment

6.3 Leak Detection

Since aboveground storage tanks are preferable to underground storage tanks, the decision to install an underground storage tank shall include sound justification giving consideration to environmental, safety, operational, and economic factors. Underground tanks can be of any volume and may include steel, fibreglass reinforced plastic, plastic storage tanks, concrete vaults, and drip collection devices. Receiving tanks for incoming trucked fluids at oil sands cleaning facilities may also be considered as underground tanks.

Leak detection and secondary containment are not required if the fluids being stored meet the following criteria:

- Waters which meet the surface discharge criteria:
 - a) chloride content: 500 mg/L maximum, (e.g. test strips),
 - b) pH: 6.0 to 9.0, (e.g. test strips and/or meter readings),
 - c) no visible hydrocarbon sheen, and
 - d) no other chemical contamination.
- Fluids, other than surface dischargeable water, which are infrequently stored in the tanks and the tanks (e.g. compressor oil drain tanks, other emergency containment tanks, pigging fluid catchment devices) are emptied immediately. Tanks must be regularly inspected to verify their integrity.

Systems collecting wash waters from floor drains (e.g. sumps) do not require leak detection and secondary containment provided they are managed properly (e.g. are not overfilled, are emptied on a regular basis, and are inspected regularly to verify integrity).

Where the characteristics of the site (e.g. topography, hydrogeology and geology) are such that the risks associated with subsurface contaminant migration and impact to groundwater are high, leak detection and secondary containment are required for any underground storage tank regardless of its usage frequency.

6.1 Construction

General construction factors for underground storage tank facilities are as follows:

- Underground storage tanks shall be designed, fabricated, tested, and installed to appropriate engineering and construction standards.

- Newly installed underground storage tanks and associated piping shall be integrity tested as a complete system prior to being put into service.
- Steel tanks shall have cathodic protection and be externally coated to minimize corrosion. An internal lining may be installed to prevent internal corrosion of an underground storage tank, but by itself is not considered to be an acceptable corrosion protection measure.
- Tank loading and unloading areas shall be designed to contain any spills or leaks which may occur during loading and/or unloading operations.

It is recommended that operators incorporate measures to prevent the overfilling of tanks; this may include automatic shut-off devices, high-level alarms, two-stage alarms, visual indicators or any other measure that will prevent overfilling. As well, breathing vents from underground tanks shall be designed to prevent the overflowing of fluids onto the ground.

6.2 Secondary Containment

Operators shall provide a secondary containment system that will contain any leakage and prevent it from impacting the environment. Sites which exhibit low permeability soil conditions (e.g. hydraulic conductivities of 10^{-6} cm/s or less) and a seasonally high groundwater table that is not within 1 meter of the bottom of the tank will not require secondary containment but will still require leak detection.

Secondary containment systems for underground storage tanks include the following:

- Double-walled tanks that possess the capability to monitor the interstitial space between the two walls.
- An impervious synthetic liner which meets the criteria described in the secondary containment section for aboveground storage tanks, and is laid down in the earthen excavation with an appropriate amount of sand, gravel, or other material placed on top of the liner surface to support the tank.
- Tanks contained in reinforced concrete or steel vaults.
- Any other system proposed by the operator which, in the AEUB's opinion, will provide a level of protection which is equal to or greater than any of the above systems.

6.3 Leak Detection

Operators must be able to verify the integrity of their tanks and demonstrate that the tanks are not leaking.

Acceptable leak detection systems for underground storage tanks shall include one or more of the following applicable methods:

- A synthetic liner under the tank with a monitoring well positioned between the liner and tank that must be sampled once per year.

The bottom of the liner should be sloped to encourage any leakage from the tank to collect at the low point, which should be down-gradient of the directional flow of the groundwater. At least one monitoring well must be completed in the low point and positioned between the secondary containment liner and the tank for the purpose of monitoring any leakage from the tank.

- Annual interstitial space monitoring of double-walled tanks using pressure monitoring, vacuum monitoring, electronic monitoring, vapour detection, manual sampling, or an equivalent method.
- Annual visual detection of vaulted tanks.
- Monthly monitoring of weeping tile systems which may be in place for single-walled tanks. Weeping tile systems shall only be permitted where there are low permeable soil conditions (e.g. the hydraulic conductivities are 10^{-6} cm/s or less) and the seasonal high groundwater table is not within 1 metre of the bottom of the tank.

A continuous loop of weeping tile should be placed around the tank or primary containment device at a depth approximating the deepest portion of the structure and in such a fashion as to encourage the movement of groundwaters which may occur under the containment device towards the weeping tile. The weeping tile should be sloped to encourage the collection of fluids at the lowest point, which should be down-gradient of the directional flow of the groundwater. At least one monitoring well must be completed at the collection point for the purpose of monitoring any leakage from the containment device. Criteria for the installation of weeping tile may be found in the Drainage and Plumbing Act.

- Any other system proposed by the operator which, in the AEUB's opinion, will provide a level of protection which is equal to or greater than any of the above systems.

In the event that the leak detection system indicates that a tank may be leaking, the operator must verify the integrity of the tank, notify the appropriate AEUB area office, and initiate any corrective actions. The actions must be documented. This may include:

- Repairing the tank and testing as per a new installation.
- Replacing the tank and testing as per a new installation.
- Assessing the area surrounding the tank for contamination and initiating clean-up activities as required.

Refer to section 10.0 for the requirements on the frequency of leak detection monitoring.

7.0 STORAGE REQUIREMENTS FOR CONTAINERS

Contents

7.1 Secondary Containment

7.2 Leak Detection

7.3 Weather Protection

It is recognized that in some circumstances, the storage of material in containers may pose an environmental hazard due to the nature of the stored materials, the material quantity, and the topography, hydrogeology, and surficial geology of the site. The following requirements have been prepared to address these concerns and are applicable to the storage of both solids and liquids in containers.

A container or a collection of containers with an aggregate volume less than 1 m³ does not require secondary containment or weather protection. Non-visual leak detection and secondary containment provisions are not required for this volume of containers; however, this exemption is not applicable to sites where a release or spill could not be contained onsite, where there is a reasonable expectation that a spill or release could impact a stream, water body, groundwater, or where other environmental concerns exist.

A collection of containers with an aggregate volume greater than 1 m³ (e.g. approximately five 45-gallon drums) shall require secondary containment. Weather protection may also be appropriate to maintain the integrity of the container. The type of secondary containment and weather protection depends on the nature of the contained material, the type of container, and the design of the storage compound.

7.1 Secondary Containment

Secondary containment systems for containers (e.g. dikes, curbs and collection trays) must be constructed of materials that are impervious to the materials being stored and shall be:

- Constructed of material which will not react with or absorb any material being stored and which has no openings that may provide a direct connection to the ground underneath or surrounding the primary container.
- A minimum height of 15 cm, or have a net capacity greater than that of the largest container within the storage area, or 15% of the total volume of all containers in the storage area, which ever is greater.
- Achieved via the proper use of at least one of the following devices:
 - a) storage compound that meets the secondary containment criteria for above ground storage tanks (e.g. impervious liner and dike; see section 5.2.2),
 - b) storage building,

- c) storage trailer,
- d) metal and plastic bins,
- e) overpacks,
- f) drip trays or spill pallets, or
- g) any other device that is deemed to be acceptable by the AEUB.

Storage trailers and buildings include the following:

- a) clad structures with concrete floors and curbing where the curb is a minimum height of 15 cm and is placed on the perimeter of the floor in such a manner that the contained material can not escape between the floor and curb,
- b) clad structures with a containment floor,
- c) sealed shipping containers with a containment floor, and
- d) loading dock buildings with a containment floor.

Design considerations for trailers and buildings shall include the following:

- a) compatibility of the construction materials with the materials being stored,
- b) proper ventilation of vapour emissions from the materials being stored,
- c) compliance with fire and electrical codes,
- d) security measures or procedures to prevent unauthorized entry, and
- e) absence of floor drains directly connected to the outside.

7.2 Leak Detection

Leak detection systems, other than visual leak detection, shall not be required for the storage of containers, provided the operator can demonstrate that a container storage area is protected from the elements and/or has an appropriate secondary containment system. Any abnormal circumstances must be documented.

7.3 Weather Protection

Weather protection is intended to preserve the condition of the primary container and hence the usefulness of the material contained therein. Weather protection is considered to be a physical cover/coating over containers. As a result of this protection, the containers and its contents are preserved.

- Acceptable weather protection devices may include the following:
 - a) covered metal or plastic bins,
 - b) overpacks,
 - c) storage docks possessing a roof and walls on three sides,
 - d) secured canvas or plastic tarpaulins,
 - e) protective coatings, and
 - f) storage trailers and buildings.
- Trailers and buildings shall be considered as appropriate weather protection for long-term container storage.

- Consideration should be given to the following when designing a weather protection device or system for containers:

a) *Storage Time:*

Longer storage periods may result in the deterioration of boxes and other containers and warrant the use of more durable, better quality materials for ensured protection.

b) *Accessibility:*

Containers requiring access on a daily basis should have a convenient access.

c) *Climatic Conditions:*

Rain will increase the moisture under a tarp, creating conditions for rapid deterioration of some types of containers. Snow will decrease access to containers and will deteriorate protection devices such as tarpaulins. Consideration should be given to the effects of ultraviolet radiation, wind, and temperature.

d) *Accumulated Precipitation:*

Where containers are located within secondary containment systems such as storage compounds or curbed concrete pads, weather protection may deflect precipitation into the secondary containment system. This creates concerns regarding the collection and disposal of the accumulated water, the potential for the displacement of any spilled materials, and the impact the water will have on the integrity of the containers.

8.0 STORAGE REQUIREMENTS FOR OILY WASTE STORAGE FACILITIES

Contents

8.1 Secondary Containment

8.2 Leak Detection

The storage facilities described below are typically used to:

- store produced sand from a heavy oil/oil sands scheme, or
- receive oily wastes or store process solids at an oilfield waste management facility.

Only stand-alone oily waste storage facilities require formal approval by the AEUB. For application purposes concerning an oily waste storage facility, refer to the section on *Oilfield Waste Management Facility Application Requirements* in the *AEUB Oilfield Waste Management Requirements*.

For those storage facilities that will be constructed on an AEUB approved site, a written notification must be submitted to the appropriate AEUB field office. A copy of the notification must also be sent to the AEUB approving department. The notification shall describe the:

- design of the storage facility,
- type(s) and volume(s) of stored materials,
- storage durations, and
- final disposal/treatment methods of the stored waste materials.

Oily wastes are defined as those waste materials containing oil generated during conventional oil, in situ oil sands, and heavy oil production and includes sand, sludges, slop oil, and oil spill material (oil laden snow, earth, etc.). Oily waste storage facilities are usually approved as part of an oil sands scheme or operation or as part of an oilfield waste management facility. When an oily waste storage facility is included in the development of a new oil sands scheme, the design of the storage facility shall be described in the application for the scheme.

Acceptable oily waste storage facilities include:

- Concrete lined earthen excavations with an underlying leakage monitoring system allowing for the monitoring of possible leakage through the concrete.
- Earthen excavations with a primary containment device, an impervious synthetic liner system for secondary containment, and an engineered seepage path flowing to a monitoring well located between the secondary and primary containment devices.
- Semi-buried metal tanks with external and internal corrosion protection and an appropriate leak detection and secondary containment system.
- Aboveground steel or concrete facilities with an appropriate secondary containment and leak detection system.
- Any other method proposed by the operator which, in the AEUB's opinion, will adequately store and contain oily wastes.

It is expected that oily waste storage facilities will be designed to provide collection and containment for spills which may occur during loading or unloading operations.

Although **blowdown fluids** from shallow gas wells contain saline materials as opposed to oily wastes, it is expected that the design of central receiving systems for those fluids will also be consistent with the requirements of this section.

8.1 Secondary Containment

For those oily waste storage facilities that are below grade and are incorporating a secondary containment system, it shall consist of a synthetic, impervious liner. The secondary containment liner shall be laid down in the earthen excavation with an appropriate

amount of sand and gravel placed on top of the liner surface to support the primary containment device (which in some situations may be a tank or another liner).

Aboveground facilities may use either an impervious clay or synthetic liner. In both situations, the liner shall meet the criteria described in the secondary containment section for above ground storage tanks (see section 5.2.2).

Other secondary containment systems proposed by the operator which, in the opinion of the AEUB, which will provide a level of protection which is equal to or greater than the above systems will also be acceptable.

8.2 Leak Detection

Acceptable leak detection systems for oily waste storage facilities shall include:

- A weeping tile system (as described in section 6.3).
- A monitoring well positioned between the synthetic liner used for secondary containment and the primary containment device (as described in section 6.3).
- Any other system proposed by the operator which, in the AEUB's opinion will provide a level of protection which is equal to or greater than any of the above systems.

Refer to section 10.0 for requirements on the frequency of leak detection monitoring.

9.0 STORAGE REQUIREMENTS FOR SOLID MATERIALS ON BULK PADS

Bulk pads may need to be used by generators for the storage of some solid materials. Typical materials may include coke produced from oil sands upgrading, contaminated soils, spent dessicant, catalyst, and activated carbon. In such cases, the bulk material storage area shall incorporate:

- An impervious clay or synthetic liner, concrete, or asphalt base pad with a slope directed to a catchment device to allow for the collection of precipitation and any generated leachate.

For bulk pads, the liner or pad is considered the primary containment device and shall meet the criteria specified in section 5.2.2 on liners for above ground tanks. However, the hydraulic conductivity must be 10^{-7} cm/s or less as this is considered to be the primary containment device.

- A continuous curb with a minimum height of 15 cm on at least three sides of the base pad.

- Any other method proposed by the operator which, in the AEUB's opinion, will provide a level of protection which is equal to or greater than the above methods.

In situations where the stored material(s) are wet or leachable, it may be appropriate to consider a leak detection system under the pad.

10.0 STORAGE INSPECTION, MONITORING AND RECORD KEEPING REQUIREMENTS

Operators of a storage area/facility shall:

- Maintain accurate inventory records and retain the records on file for 2 years. Where applicable, this would include copies of all dockets for material received and shipped.
- Maintain inspection and corrosion monitoring programs which will provide an indication of the integrity of tanks and piping. Records shall be retained for a minimum of 2 years. Any abnormal circumstances identified from the monthly visual inspections must also be documented.
- Routinely inspect the storage area for leaks and indications of problems and initiate corrective actions as required.
- Annually sample monitoring wells associated with leak detection systems and analyze the water samples for the appropriate parameters listed below:
 - a) pH,
 - b) electrical conductivity,
 - c) major ions (e.g. Ca, Mg, Na, K, NO₃, SO₄, Cl, PO₄),
 - d) oil and grease, and
 - e) any other parameter deemed necessary by the Board.

Note: If any of the parameters have changed significantly in comparison to the previous results or indicate there may be a potential concern, then additional analyses should be performed for verification and if necessary, followed by corrective measures.

- In addition to the above, sample on a monthly basis those monitoring wells associated with weeping tile systems that have been put in place for single-walled underground storage tanks or oily waste storage facilities. Field test the samples for pH (e.g. test strips or meter), chlorides (e.g. test strips), hydrocarbon odour, and a visible oil sheen. If there is indication of a problem from the monthly tests, then laboratory analysis should be performed for verification and then followed by appropriate corrective measures if necessary.
- Maintain the leak detection records for a minimum of 2 years. The AEUB must be notified if any of the monitoring results indicate a concern. The notification shall

describe:

- a) the parameters that changed,
 - b) the investigative work conducted, and
 - c) any remedial or corrective work that has occurred or is proposed.
- Where applicable, retain groundwater monitoring records for 5 years.
 - Maintain records from alternative leak detection systems (electromagnetic surveys, soil vapour surveys, interstitial monitoring of double walled tanks, weeping tile monitoring wells, and inventory reconciliation, etc.) for a minimum of 2 years.
 - Keep all required approvals, licences, or permits on site or at the field/plant offices.
-

11.0 REFERENCES

1. Energy Resources Conservation Board, 1993. "Recommended Oilfield Waste Management Requirements".
2. Energy Resources Conservation Board. "Oil and Gas Conservation Act and the Oil and Gas Conservation Regulations" as periodically revised.
3. Energy Resources Conservation Board Informational Letter IL 84-11, "Approval, Monitoring, and Control of Sulphur Storage Sites".
4. Energy Resources Conservation Board Informational Letter IL 85-16, "Storage, Handling, and Disposal of Oily Wastes".
5. Energy Resources Conservation Board Guide G-50, 1993. "Drilling Waste Management".
6. National Standard of Canada, Propane Installation Code CAN/CGA-B149.2-M91.
7. National Research Council of Canada. "Alberta Fire Code 1992".
8. Alberta Environment, EPS, 1988. "Hazardous Waste Storage Guidelines".
9. Alberta Environmental Protection, 1993. "Environmental Protection and Enhancement Act, Waste Control Regulation, Alberta Regulation 129/63.
10. Alberta Health, 1984. Alberta Public Health Act, Alberta Act P-27.1, 1984.
11. Canadian Council of Ministers of the Environment, 1993. "Environmental Code of Practice for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products".
12. Canadian Council of Ministers of the Environment, 1989. "Environmental Code of

Practice for Underground Storage Tank Systems Containing Petroleum Products". Publication CCME-EPC-LST-61E, March 1993.

13. Canadian Council of Ministers of the Environment, 1994. "Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products". Publication CCME-EPC-LST-71E, August 1994.
14. Alberta Environmental Protection, Industrial Wastewater Branch, 1995. "Sanitary Sewage Management Guidelines for Industrial Operations".
15. Canadian Standards Association, 1994. "Oil and Gas Pipeline Systems Z662-94, Oil and Gas Industry Systems".
16. American Petroleum Institute, 1994. "Welded Steel Tanks for Oil Storage, API Standard 650".
17. American Petroleum Institute, 1992. "Tank Inspection, Repair, Alteration, and Reconstruction, API Standard 653".

APPENDIX 1.0

Contents

Storage Requirements for Existing Facilities

- A1.1 Aboveground Storage Tanks
 - A1.2 Underground Storage Tanks
 - A1.3 Existing Monitoring Programs
 - A1.4 Containers
-

Storage Requirements for Existing Containment Devices

Operators of facilities constructed and operated prior to 1 January 1996 will be required to demonstrate that their storage practices, facilities, and storage devices (e.g. tanks, containers) meet the intent of these requirements and follow existing AEUB regulations. The objective of these storage requirements for existing facilities is to verify and possibly enhance the integrity of existing primary containment devices.

It is the responsibility of the operator to design and implement a suitable testing and inspection program to verify the mechanical integrity of existing storage devices.

Those primary containment devices that currently possess a higher risk due to their age, type of service, site-specific environmental sensitivities, and/or a general lack of available information on the device should receive a priority scheduling for testing/inspection.

The results of the tests, inspections, and any corrective action must be documented, retained by the operator, and made available to the AEUB upon request.

All storage devices installed prior to 1 January 1996 must either meet the new requirements or be tested/inspected to verify integrity and be subject to the following conditions.

A1.1 Aboveground Storage Tanks

All aboveground storage tanks shall be inspected prior to 31 October 2001 (see Figure 1). Thereafter, an ongoing testing/ inspection program shall be conducted as a minimum once every 5 years. The degree of the testing/inspection program shall be based on the age of the tank, the type of service, preventative measures (e.g. cathodic protection, internal coating), as well as the previous inspection results. Operators may conduct alternate inspection schedules based on section 4 of API Standard 653.

Suitable testing/inspection methods for aboveground storage tanks may include, but are not limited to:

- 100% external inspection (if bottom of tank is visible), and
- internal visual inspection.

Additional optional measures include, but are not limited to:

- a) hydrostatic leakage tests performed at least once every 5 years,
- b) pneumatic (pressure or vacuum) leakage tests performed at least once every 5 years,
- c) when possible, a visual internal tank inspection performed at least once every 5 years,
- d) soil vapour and/or groundwater monitoring in the immediate vicinity (down-gradient) of the aboveground tank, or
- e) any other system proposed by the operator which will provide a level of protection that is equal to or greater than any of the above systems.

A1.2 Underground Storage Tanks

All underground storage tanks shall be inspected prior to 31 October 2001 (see Figure 1). Thereafter, an ongoing testing/ inspection program shall be conducted at least once every 3 years. The frequency of the testing/inspection program shall be based on the age of the tank, the type of service, preventative measures (e.g. cathodic protection, internal coating), as well as the previous inspection results.

Suitable testing/inspection methods for underground storage tanks may include, but are not limited to:

- hydrostatic leakage tests, and
- pneumatic (pressure or vacuum) leakage tests.

Additional optional measures include, but are not limited to:

- a) when possible, a visual internal tank inspection performed at least once every 3 years,
- b) soil vapour and/or groundwater monitoring in the immediate vicinity (down-gradient) of the underground tank, or
- c) any other system proposed by the operator which will provide a level of protection that is equal to or greater than any of the above systems.

A1.3 Existing Monitoring Programs

Results from existing monitoring programs can also be used to determine whether or not tanks are leaking. Methods used to detect contaminants such as salts and hydrocarbons in the soil or groundwater within the immediate vicinity of a storage tank are considered indirect methods as opposed to direct methods that actually verify or test the integrity of the tank.

Examples of existing monitoring programs may include:

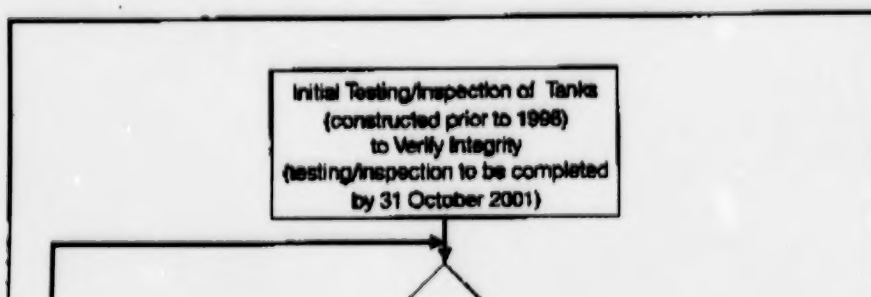
- Groundwater or soil vapour monitoring wells installed in the immediate vicinity (e.g. down-gradient of the groundwater flow) of the storage tank.
- Electromagnetic surveys (for tanks containing brine or brine equivalent liquids).
- Soil vapour survey for hydrocarbons (for tanks containing hydrocarbons).
- Volumetric tests that measure a change in fluid levels and are sufficiently accurate to account for leaks.

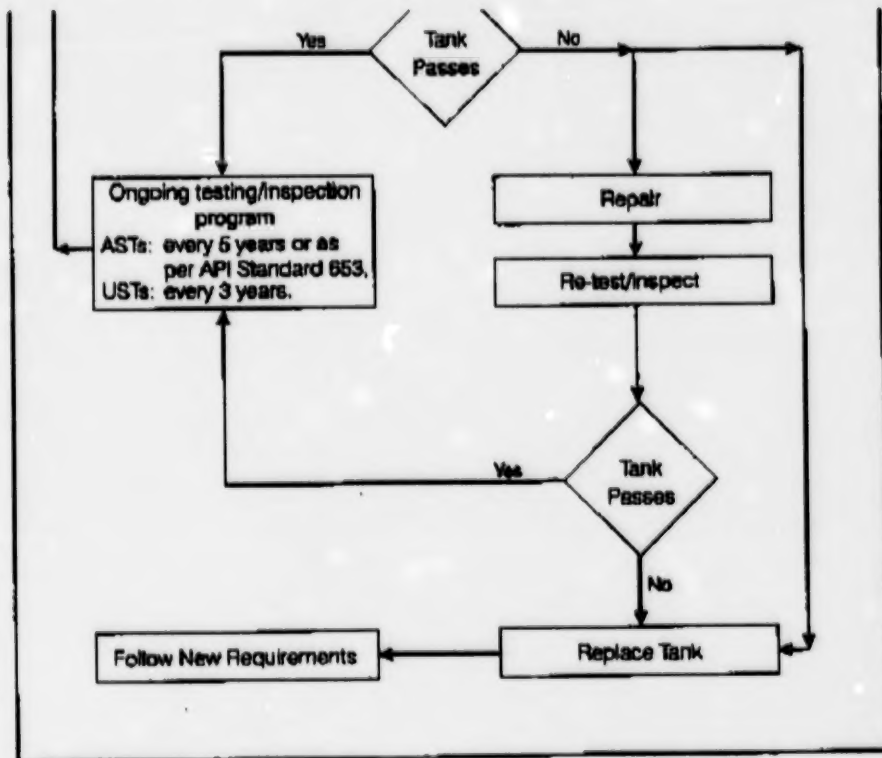
A1.4 Containers, Oily Waste Storage Facilities, and Bulk Pads

All facilities have until 31 October 2001 to adhere to the storage provisions identified in sections 7.0, 8.0, and 9.0 of these requirements for containers, oily waste storage facilities, and bulk pads. In the interim, inspections should be made to ensure that all storage practices are sound.

40

FIGURE 1 EXISTING TANK INSPECTION AND REPLACEMENT PROGRAM





[Return to top of document](#)